

NAME: _____

CLASS: _____

DATE: _____

TESTING STABILITY OF A WATER ROCKET

Key terms: - Stable - Unstable - Center of gravity (CG) - Center of pressure (CP)

A rocket that flies straight through the sky is said to be a stable rocket. A rocket that veers off course or tumbles is said to be unstable.

The stability of a rocket depends upon its design. Two things need to be considered carefully during a rocket's design, rocket's center of gravity (CG) and center of pressure (CP).

Center of gravity (CG) is a point on that would balance a rocket like a seesaw (it is also the place in which half of the mass of a rocket is in front and the other half is behind).

Center of pressure (CP) depends on rocket's surface area. This is a point where half of the surface area of a rocket is on one side and the half is on the other.

Positioning these two centers on a rocket is critical for its stability.

DETERMINING CG AND CP OF A ROCKET

1. Prepare a complete model of the rocket. Tie a string around the middle of the rocket model just like the one in the figure. Slide the string loop to a position where the rocket balances.
2. Mark the position of this loop. This represents the CG.
3. Lay the rocket's model on a piece of cardboard. Carefully trace the rocket on the cardboard and cut it out.
4. Lay the cardboard silhouette you just cut out on a ruler and balance it. Mark the ruler position. This represents the CP.
5. If your Center of Mass is in front of the Center of Pressure, your rocket should be stable. You can proceed then to the swing test.
6. **Swing test:** Tape the string loop you tied around your rocket begins swinging your rocket in a circle. If the rocket points in the direction you are swinging it, the rocket is stable. If not, add more clay to the rocket nose cone or add larger fins. Repeat the test until the rocket flies true in the direction you swing it.

